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ABSTRACT

Conducted in three phases, a study examined the teaching of reading in the early stages of primary school. The study was done by a research team from the University of St. Andrews School of Psychology, Scotland. Phase one explored methods of teaching reading and spelling in a sample of 12 schools within one Education Authority. Phase two examined the impact of analytic and synthetic phonics teaching (which teaches small groups of letters very rapidly) on reading, spelling, and phonemic awareness. Phase three compared the effects of phonemic awareness training versus synthetic phonics teaching on reading, spelling, and phonemic awareness. Results indicated: (1) increases in reading and spelling over and above those attained with analytic phonics; (2) reading and spelling skills were well above national norms in phase three; (3) synthetic phonics led to the best gains in phonemic awareness; and (4) the synthetic phonics method led to fewer underachieving children. (Contains 4 figures and 12 references.) (CR)

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Accelerating Reading Attainment: The Effectiveness of Synthetic Phonics

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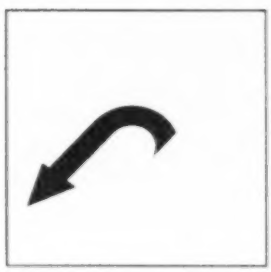

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ACCELERATING READING ATTAINMENT: THE EFFECTIVENESS OF SYNTHETIC PHONICS

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Introduction

In 1992/93, a research team from the University of St. Andrews School of Psychology began a study of the teaching of reading in the early stages of primary school. The final stage of the study (1997/98) was part-funded by Clackmannanshire Education Authority and The Scottish Office Educational Research Unit.

The research was conducted in three phases. The first phase explored methods of teaching reading and spelling in a sample of 12 schools within one Education Authority. The second and third phases were designed as 'intervention' studies in which the researchers provided teaching in phonics for children both outwith (Study 2) and within the classroom (Study 3).

In this Interchange, the researchers begin by summarising the state of our existing knowledge of the teaching of reading. They go on to distinguish between analytic and synthetic phonics, providing examples of how each is taught within the classroom. Finally, they report the results of the three studies, concluding that synthetic phonics leads to fewer underachieving children and can be included in classroom teaching programmes to boost the teaching of reading.

Background

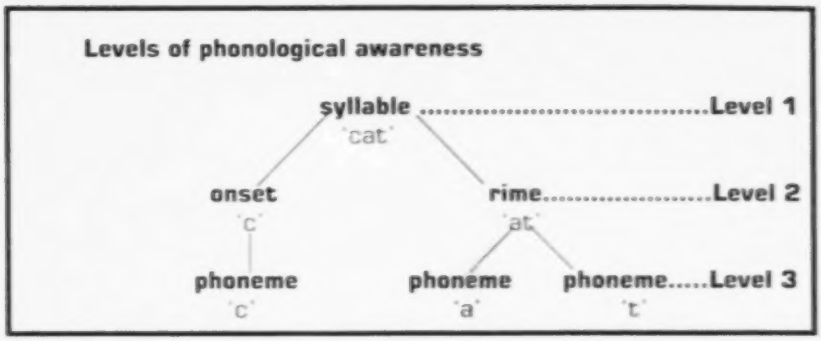
Phonological awareness as a predictor of later reading

Much current research on literacy is aimed towards understanding how children learn to recognise words, and how to improve that process. Some of this focuses on how children deal with print and how to make them more effective decoders of unfamiliar words. There is also a large body of research concerned with the extent to which young children can hear the sounds in words, i.e. their **phonological** awareness. It has been found in a number of studies that pre-school children with well-developed phonological awareness turn out to be better readers later on.

What kind of phonological awareness predicts later success in reading? Pre-school non-readers are not very good at detecting **phonemes** in words. (Phonemes are the basic functional units of sound which together make a word, e.g. the phonemes of the word 'cat' are 'cuh', 'ah' and 'tuh', corresponding with the written letters 'c','a' and 't'). However, there is evidence that pre-school non-readers have a better awareness of rhymes e.g. they can split 'cat' into 'cuh-at'. This is described by linguists as **segmentation at the onset-rime level,** 'cuh' being the **onset** and 'at' being the **rime.** This also means that these young children have some phonemic awareness as the onset often corresponds with a phoneme. The levels of phonological awareness from syllable to phoneme are shown on page 2.

Many schools include a programme of phonological awareness when teaching beginning readers.

Does research really support the efficacy of such an approach?



A key question is: how useful to reading ability are onset-rime and phoneme awareness skills - is it worth training these skills without the aid of print?

Effects of phonological awareness training on reading

Bradley and Bryant (1983) showed that pre-school children's awareness of onsets and rimes was a significant predictor of later reading ability. This led them to examine whether direct training in these skills would enhance later reading ability. However, this study is often misinterpreted, as the researchers did not find that training in how to categorise **sounds in words** increased reading skill. The only effective training programme carried out by the researchers was one in which plastic letters representing sounds were used as part of training in sound categorisation.

In fact, only three studies have effectively trained phonological awareness skills without letters and found any gains in reading (cited in Share, 1995) and two of these were carried out on school-age children. With school-age children phonological awareness training might help them see for themselves the linkages between sounds and letters, or the findings could be due to contamination by teachers using letters during the training. Most studies that have effectively increased reading skill by training phonological awareness have also used letters in the programme (cited in Share, 1995).

It would appear that the aspect of phonological awareness that is most useful for reading is the phoneme level. We know that this awareness of phonemes does not develop naturally, and its emergence is closely associated with learning to read in an alphabetic language (Morais *et al*, 1987). This raises the question of why pre-school non-readers have any awareness of phonemes at all. There is in fact evidence that such skills might be developed by **protoliteracy knowledge**, i.e. knowledge of letter sounds and ability to recognise environmental print (logos, traffic signs etc.) (Johnston *et al*, 1996). This suggests that it is reading and reading-related skills which develop phoneme awareness rather than the reverse.

Can children learn to read at the phoneme level right at the start?

One influential school of thought suggests that in the early stages children should be taught at the onset-rime level, e.g. 'cuh-at' (Goswami, 1994). This ap-

proach would be compatible with the children's level of phonological awareness - when they read a word such as 'beak', their awareness that this segments into 'b-eak' helps them to read **by analogy** words such as 'peak' (Goswami, 1986).This idea is supported by the finding of an association between the ability to read by analogy and being able to detect which of a series of spoken words does not rhyme (Goswami, 1990). This suggests that children need good rhyming skills to be able to make these analogies and that it would be helpful to train pre-readers in awareness of onsets and rimes. However, Goswami (1993) is of the view that the ability to map letters on to phonemes is the mature level of performance that we ultimately wish to foster in children.

The onset-rime analogy method leads learning readers to the phoneme level very gradually but our research shows that it may be very effective to teach children from the start how letters map on to phonemes in words. Once children have a firm grasp of this, they may be able to decode new words for themselves. This skill is an important self-teaching mechanism which will help them to expand their sight vocabularies (Share, 1995) and set them on the road to independent reading.

Children need to become aware of phonemes in words.

Should children be taught to read at the phoneme level right at the start?

If children were taught the relationship between letters and phonemes at the outset they might not then need to use an analogy approach when beginning to learn to read. This is advantageous because the analogy approach is very demanding, requiring awareness of onsets and rimes, and the ability to recognise quite a large number of words in order to read new ones by analogy. Rimes are also quite complex in terms of spelling patterns - in 'peak' and 'beak' the vowel sound is represented as 'ea', which is pronounced differently in words such as 'steak'. Furthermore, the sound which 'ea' represents in 'beak' is spelled differently in other words e.g. 'ee' in 'meek'.

Two types of phonics teaching draw children's attention to the relationship between letters and sounds at the phoneme level, the analytic and synthetic phonics methods.

A comparison of analytic and synthetic phonics teaching in Primary 1 classes

Phonics teaching is known to accelerate reading skills

Where in the continuum of phonics teaching does current practice lie in your school?

In our work, we have contrasted two types of phonics teaching - **analytic** and **synthetic.** At their extremes, these two methods can be very different, but certain elements of **synthetic phonics** can be incorporated in the teaching of **analytic phonics.**

Analytic phonics

Analytic phonics teaching starts at the whole word level. It can be taught in parallel with, or some time after, graded reading books have been introduced using a look and say approach. Typically, as found in Study 1, children are taught one letter sound per week, and are shown a series of alliterative pictures and words which start with that sound e.g. **c**ar, **c**at, **c**andle, **c**ake, **c**astle, **c**aterpillar. When the 26 initial letter sounds have been taught in this way, children are introduced to middle sounds e.g. c**a**t, b**a**g, r**a**g etc., and final sounds, e.g. na**p**, cu**p**, pi**p** etc.

Then come initial consonant blends, e.g. **'bl', 'cr', 'sp'**; final consonant blends, e.g. **'nt', 'ng', 'st'**; vowel and consonant digraphs e.g. **'ee' 'oo' ; 'ch' 'sh'**; silent 'e' e.g.'sl**a**t**e**', 'bl**ue**' etc. Some children may be taught how to sound and blend the consecutive letters in unfamiliar words to be able to pronounce them e.g. 'cuh-ah-tuh' for 'cat'.

Synthetic phonics

Synthetic phonics is used in Germany and Austria and is generally taught before children are introduced to books or reading. It involves teaching small groups of letters very rapidly, which are selected because they combine together to make up many words. For example, in *Jolly Phonics* (Lloyd, 1992) and in Hickey's Multi-Sensory Language Course (1992) the first block of letter sounds is 's', 'a', 't', 'i', 'p', 'n', which make up more three-letter words than any other six letters. Children are shown many of the words that these letters generate (e.g. 'cat', 'sat', 'tin', 'pin' etc.). In our approach, children have magnetic letters which they use to practise picking out the appropriate letters for a spoken word, pushing the letters together and sounding and blending the letters to form the word. Consonant blends are not explicitly taught at all, although digraphs (i.e. a phoneme represented by two letters e.g. 'sh', 'th', 'ai', 'oa') are taught.

Analytic and synthetic phonics compared

Analytic phonics

- the whole word is seen and children have their attention drawn to certain letters and their sounds
- is often taught after an initial sight vocabulary has been established, alongside reading-scheme books
- teaching can take up to three years.

Synthetic phonics

- all of the letter sounds are taught very rapidly and the emphasis is on how words are built up
- generally starts before children are introduced either to whole words, or to reading-scheme books
- can be taught in a few months.

These are two extremes, and most phonics methods lie mid-way between the two. Synthetic phonics can be introduced after or alongside reading-scheme books and analytic phonics can also include teaching children to sound and blend unfamiliar words i.e. to carry out word-building. However, sounding and blending now seems to be taught decreasingly in analytic phonics.

We have carried out three studies of phonics teaching in Scottish primary schools. One surveyed prevailing classroom practices and the other two studies exam-

ined experimentally what aspects of phonics teaching are particularly beneficial in accelerating literacy skills.

Study 1: Phonics teaching methods in Scottish Primary 1 Classes

Our research started out by examining how phonics was taught in a sample of 12 Scottish schools within one Education Authority, to investigate which aspects of phonics teaching appear to be most effective in producing independent readers (Johnston *et al*, 1995).

We discovered that at the start of Primary 1, children were encouraged to read whole words with associated pictures and captions, building up a basic sight vocabulary of key words and words related to the reading scheme. Phonics teaching was systematic and designed to follow a gradual analytic approach during the first three years of school. It was introduced in the second half of Term 1, implemented as described on page 3, the teaching of the 26 initial letter sounds being completed at the start of Term 3. In nearly all of the classes we observed, the children were not explicitly taught to sound and blend consecutive letters of unfamiliar words in order to pronounce them. Nevertheless, teaching of consonant-vowel-consonant (CVC) words in Term 3 was associated with large gains in reading skills.

One class, however, had an accelerated analytic phonics programme which was introduced at the outset of Primary 1, the teaching of the 26 initial letter sounds being completed in January of Term 2. These children were also encouraged to use a sounding and blending strategy when tackling an unknown word in their oral reading practice with the teacher. This teacher was using an accelerated analytic/synthetic phonics approach to good effect as was demonstrated when the children's reading was measured again after a two-year period.

Results for Study 1

We learnt from Study 1 that:

- **accelerating the teaching about letter sounds in the middle and final position of words coincided with an increase in word-reading skill**
- **teaching explicit sounding and blending coincided with gains in reading and spelling**
- **gains made in the accelerated phonics/sounding and blending programme were maintained over a two-year period.**

In Study 1, teachers who taught sounding and blending explicitly accelerated reading attainment.

Are there any implications for current practice in your school?

Study 2: A training study of Primary 1 children to examine the impact of analytic and synthetic phonics teaching on reading, spelling and phonemic awareness

The high levels of achievement in one class in our first study seemed likely to reflect the distinctive classroom programme we observed. We wanted to establish whether the programme caused these reading gains, and in particular, which aspects of this teacher's approach were accelerating reading attainment.

In our second study all of the children continued with their normal class reading activities and the additional training programme was provided outside the classroom. Three groups of children received different training programmes.

The programme started in the first week of October and all children were given extra tuition for a ten-week period. This consisted of two 15-minute sessions per week, and although the programmes differed, all three groups were exposed to the same print vocabulary. The control group received no extra phonics training: the list of new print words was taught using the look-and-say method. The two experimental groups received accelerated teaching of letter sounds at the rate of two per week. Both groups were taught using the list of new print words shown to the control group. The attention of one of the experimental groups was drawn only to letters in the initial position of words (analytic phonics approach). The other group received synthetic phonics teaching, their attention being drawn to letters in initial, middle and final position of words. This group was also taught to sound and blend the letters and shown how to use magnetic letters to build up the words for themselves. After the ten-week period no further intervention training took place and the pupils reverted to the normal class routine. At this time (March Primary 1) word reading, spelling and phoneme awareness were assessed using the British Ability Scales (BAS), the Schonell Spelling Test and the Yopp-Singer Test.

In Study 2 accelerated training of letter sounds on its own did not increase reading skill but sounding and blending did

What would be the implications in your school of accelerating the pace of letter-sound training and explicit sounding and blending in Primary 1?

Results for Study 2

We concluded from Study 2 that:

- **synthetic phonics teaching led to better reading, spelling and phonemic awareness than analytic phonics teaching**
- **this superiority was not due to the fact that in synthetic phonics the letter sounds are taught at a faster pace – the fast pace 'analytic' approach led to less success than the synthetic approach**
- **the advantage must therefore lie in showing children how to sound and blend letter sounds in order to pronounce unfamiliar words.**

Study 3: A comparison of the effects of phonemic awareness training versus synthetic phonics teaching on reading, spelling and phonemic awareness in Primary 1 classes

In most classes children are allocated to different ability groups for reading

What would be the advantages of teaching phonics on a whole-class basis?

The Government's Early Intervention Programme prompted us to begin our third study, jointly funded by Clackmannanshire Council and the Scottish Office. We had noted that in Study 2, synthetic phonics teaching markedly increased the children's ability to identify phonemes in spoken words. Our next study went on to examine whether synthetic phonics teaching was more effective than direct training in **phonological awareness** (the ability to hear sounds in words) in developing the children's reading and spelling skills (Johnston and Watson, 1997).

We also wanted to know whether we had found synthetic phonics to be effective because it had been taught in small groups outside the classroom or whether it would be just as effective if taught on a whole-class basis.

Pre-test measures were carried out in 13 Primary 1 classes, who were allocated to one of three groups (analytic phonics, phonemic awareness and synthetic phonics) for a third study. It was important to establish that children of all socio-economic backgrounds benefit from synthetic phonics teaching,therefore we used Clackmannanshire Council's Indices of Disadvantage to control for the effect of socio-economic background. The synthetics group was slightly more disadvantaged than the other groups.

This time, the programmes were implemented by the teachers of the 13 Primary 1 classes and replaced the normal school phonics programme. Teachers in each of the research groups received training in the structured model they were asked to deliver. There was no additional help for children in any of the classes during the teaching time in the 16-week programme. All of the children saw the same print vocabulary during the training programme, which started in mid-September and proceeded until mid-March, when the children were tested again. Reading-scheme books were introduced in November. Teaching was on a whole-class basis rather than to groups of children.

Analytic phonics control group (four classes)

Daily phonics teaching was carried out for 20 minutes a day using a systematic but gradual analytic method, whereby one letter sound per week was introduced in the initial position of words.

Phonemic awareness and analytic phonics group (four classes)

A phoneme-and-rime awareness training programme was carried out for 10 minutes a day involving the analysis and synthesis of sounds in spoken words without reference to print. This programme was kept separate from the 10 minutes a day of analytic phonics teaching, which was carried out systematically as with the analytic phonics control group.

Synthetic phonics group (five classes)

This training lasted for 20 minutes a day. Letter sounds were taught at the rate of six letter sounds in eight days in initial, middle and final positions in words, together with the formation of letters. Children were taught to sound and blend letters to read words. They were also shown how to spell words by pushing magnetic letters together, and to pronounce words by blending together the sounds of the letters.

Results for Study 3

In March of Primary 1, a number of assessments were made of children's progress. The results are as follows:

Word reading – Figure 1 – assessed using British Ability Scales (BAS)

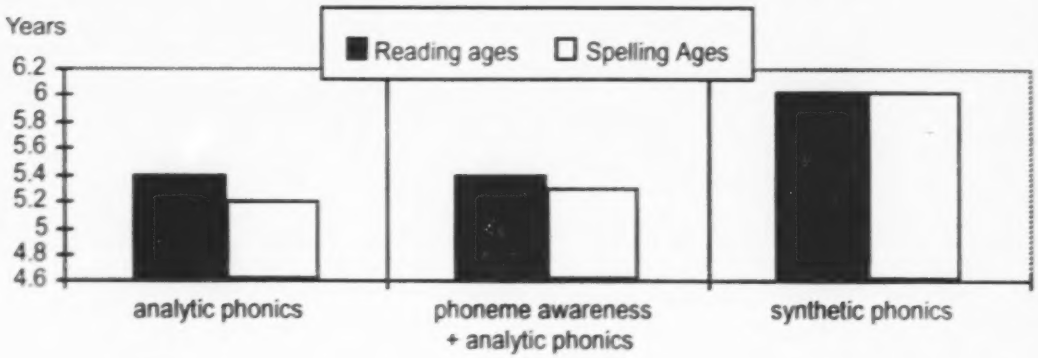
- the analytic phonics group and the phoneme awareness/analytic phonics group were reading one month behind their chronological age
- the analytic phonics group and the phoneme awareness/analytic phonics group were reading equally well
- the synthetic phonics group were reading seven months ahead of the other two groups
- the synthetic phonics group were reading seven months ahead of their chronological age.

Spelling – Figure 1 – assessed using the Schonell Spelling Test

- the analytic phonics group were spelling two to three months behind chronological age
- the phoneme awareness/analytic phonics group were spelling one month behind chronological age
- the synthetic phonics group were found to be eight and nine months ahead of the analytic phonics and phoneme awareness/ analytic phonics groups respectively
- the synthetic phonics group were spelling seven months ahead of chronological age.

Figure 1

COMPARISON OF READING(BAS) and SPELLING (Schonell) AGES



Word reading was also measured on the Clay Ready to Read Test which is a more sensitive test of emergent reading than the British Ability Scales Word Reading Test, and a somewhat different picture emerged.

Word reading – Figure 2 – assessed using the Clay Ready to Read Test

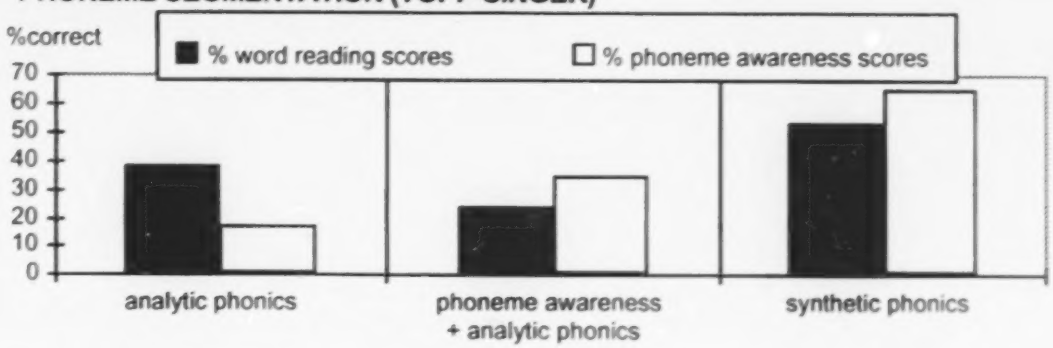
- the synthetic phonics children were still found to be the best readers
- the phonemic awareness group were poorer readers than the analytic phonics group.

Phoneme segmentation – Figure 2 – assessed using the Yopp-Singer Test

- the phoneme awareness/analytic phonics group did better than the analytic phonics group
- the synthetic phonics group did better than the phoneme awareness/analytic phonics group
- synthetic phonics teaching and phonemic awareness training led girls to have better phonemic awareness than boys, but there were no gender differences in reading at this stage.

Figure 2

% SCORES for WORD READING (CLAY) and PHONEME SEGMENTATION (YOPP-SINGER)



Results of Study 3

Study 3 showed that:

- **synthetic phonics teaching accelerated reading, spelling and phonemic awareness more rapidly than any other teaching method**
- **phoneme-and-rime awareness training increased phoneme segmentation ability but did not increase reading or spelling skills beyond the level of the control group.**

We conclude therefore that it is more effective to teach reading by a synthetic phonics approach than to teach by a gradual analytic phonics method. Phonological awareness training conferred no benefits beyond developing phonemic awareness skills.

In Study 3 training in phonological awareness did not help accelerate attainment

How were the components of your school's phonics programme selected?

Overall implications

Given that many of the children came from disadvantaged homes, does synthetic phonics teaching help underachieving pupils?

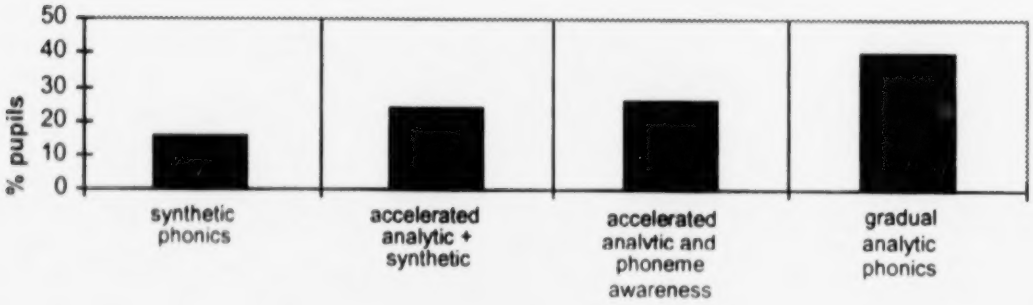
Our findings show the impact of the different teaching methods on the performance of underachieving children (defined as having a reading age of six months below chronological age on the British Ability Scales Word Reading Test) in March of Primary 1.

Comparison of levels of underachieving pupils

- gradual analytic phonics teaching produced the highest levels of underachievement
- synthetic phonics teaching produced the lowest proportions of underachieving pupils.

Figure 3:

PERCENTAGES OF UNDERACHIEVING PUPILS UNDER DIFFERENT PHONICS TEACHING CONDITIONS



Which was the best method of phonics teaching for enhancing reading skills?

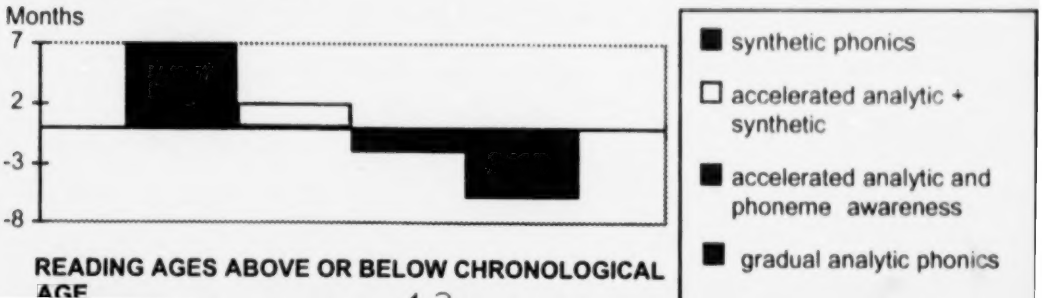
We have drawn together the findings from all three studies to examine which teaching method produced the best outcome in terms of reading achievement. Figure 4 shows which approach led to children reading in advance of what would be expected for their age, comparing performances in March of Primary 1.

Word reading

- children taught gradual analytic phonics in Study 1 were reading six months below their chronological age in March of Primary 1
- children taught synthetic phonics in Study 3 were reading seven months ahead of their chronological age in March of Primary 1.

Figure 4:

COMPARISON OF ACHIEVEMENT UNDER DIFFERENT PHONICS TEACHING CONDITIONS



What conclusions can be drawn from these studies?

By implementing a synthetic phonics programme, children can be taught to read at the phoneme level. This does not mean merely teaching them letter-sound correspondences: children have to be shown that the sequence of the phonemes in the spoken word maps on to the sequence of letters in the printed word. This can be done by teaching them small groups of letters and showing them these letters in all positions in words e.g. 'cuh','ah' and 'tuh',which corresponds with the written letters 'c', 'a' and 't'. This should be reinforced by teaching them to sound and blend letters in order to pronounce words, and to spell words using magnetic letters.

The gains made through using synthetic phonics are:

- increases in reading and spelling over and above the levels of performance achieved with analytic phonics
- in March of Primary 1, reading and spelling skills in Study 3 were found to be well above national norms: children trained for 20 minutes a day for 16 weeks had reading levels seven months ahead of what would be expected for their chronological age
- this method of teaching reading led to the best gains in phonemic awareness
- the synthetic phonics method leads to fewer underachieving children and so in classes where this method is used teachers will have more time to assist those making a slow start in reading.

Synthetic phonics teaching was shown to reduce the number of underachievers and produce the best outcome in reading achievement.

Could synthetic phonics be used to raise the levels of reading attainment for all children in your school ?

Synthetic phonics can be implemented on a whole-class basis and it can be very effective when taught as a pre-reading activity before reading-scheme books are introduced. One disturbing finding was that diluting the time spent on phonics with phonological awareness training (i.e. training children to hear sounds in words without print) actually produced lower levels of reading ability than a wholly analytic phonics teaching programme. Therefore, training children in phonological awareness without showing them either letters or printed words is not advisable.

Is synthetic phonics teaching the way forward?

Synthetic phonics is not an exclusive approach - teachers may include synthetic phonics alongside their own programmes to boost the teaching of reading. Our purpose in carrying out these studies was to discover which aspects of phonics teaching are the most effective to ensure that as many children as possible become competent readers, but we recognise that this is only one aspect of effective teaching.

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The views expressed in this Interchange are those of the authors and do not necessarily reflect those of The Scottish Office Education and Industry Department, who jointly funded Study 3 in conjunction with Clackmannanshire Council.

Please note: materials are being prepared by the researchers, with the pilot schools, to support teachers who want to incorporate synthetic phonics in their programme. The materials will be piloted later this session and available generally during the session 1999-2000

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